

Serial No.: 10/522,431
Examiner: Lee, John R.
Art Unit: 2881

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Christopher Davies	Group Art Unit: 2881
Serial No.: 10/522,431	Examiner: Lee, John R.
Filed: September 28, 2005	Attorney Docket: UDL-123
Title: Method and Apparatus for Removing Target Material from a Substrate	

Honorable Commissioner for Patents
Alexandria, VA 22313

Sir:

This is a timely reply to an Office Action dated May 18, 2006. As no claims have been added, and no extension fee is required, no fees are enclosed herewith. If any additional fee is due, please charge the fee to deposit account no. 07-1732.

STATEMENT OF THE CLAIMS

1. (currently amended) A method for removing target material from a substrate, the method comprising directing a supply of particulate material toward a target zone of target material present on the substrate and directing radiant optical energy toward the target zone, the radiant optical energy interacting with the target material and the particulate material to thereby promote ~~promoting~~ removal of target material from the substrate.
2. (currently amended) A method according to claim 1, wherein the radiant optical energy is light energy selected from the group of:
 - i) light energy;
 - ii) light energy that includes wavelengths in the visible range of the spectrum; and
 - iii) light energy that is limited to wavelengths in the visible range of the spectrum.
- 3 - 4 (cancelled)
5. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the interaction between the radiant optical energy and the particulate material is at least one of:
 - i) a thermal interaction;
 - ii) an interaction that results in a blast or shock medium acting at the target zone;
 - iii) an interaction that results in the evolution of gas having properties providing a physical or chemical interaction with material at the target zone;
 - iv) a sublimation interaction; and
 - v) an interaction that produces carbon dioxide.

6. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the interaction between the radiant optical energy and the target material is at least one of a thermal interaction and an interaction effecting ablation or pyrolysis of the target material.

7 - 11 (cancelled)

12. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material is a material in solid state at ambient temperature.

13. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the radiant optical energy is delivered as one of a pulse of optical energy and a series of pulses.

14. (cancelled)

15. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material is directed across the target zone in a direction transverse to the direction of the directed radiant optical energy.

16. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material is directed to the target zone during at least one of:

- i) times when the radiant optical energy is also directed to the target zone; and
- ii) times when radiant optical energy is not directed to the target zone.

17. (cancelled)

18. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material comprises bicarbonate of soda in particulate ~~or pellet~~ form.
19. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material is delivered entrained in a transport gas.
20. (original) A method according to claim 19, wherein the transport gas is pressurised air.
21. (currently amended) A method according to any preceding claim 1, wherein the radiant optical energy is delivered by a flashlamp delivery system.
22. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the radiant optical energy is delivered in pulse form, the energy density of the energy at the target zone being substantially in the range between 5 J/cm^2 and $[[-]]$ 150 J/cm^2 .
23. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the spectrum of the radiant optical energy is variable in a controlled manner.
24. (currently amended) A method according to ~~any preceding~~ claim 1, wherein the particulate material and the radiant optical energy is delivered via a combined delivery unit that is portable and/or hand held manipulatable.
25. (cancelled)

26. (currently amended) A method of removing graffiti or other unwanted material from an architectural or vehicle surface, the method comprising:

directing a supply of particulate material toward a target zone of the substrate, the particulate material being in solid phase at ambient temperature[[]]; and

directing radiant optical energy toward the target zone, the radiant optical energy:

i) interacting with the target material in a thermal interaction resulting in ablation or pyrolysis of at least some of the target material[[]], and[[]]

ii) interacting with the particulate material in a sublimation reaction evolving a gas having a blast effect at the target zone.

27. (currently amended) Apparatus for removing target material from a substrate, the apparatus comprising:

a particulate supply arrangement configured to direct a supply of particulate material toward a target zone of the substrate; and[[]]

a radiant optical energy delivery system configured to direct radiant optical energy toward the target zone[[]], the radiant optical energy interacting with the target material and the particulate material to thereby promote ~~promoting~~ removal of target material from the substrate.

28. (currently amended) Apparatus according to claim 27, wherein the radiant optical energy delivery system comprises a flashlamp system.

29. (currently amended) Apparatus according to claim 27 ~~or claim 28~~, wherein the apparatus is controlled to limit at least one of the pulse rate ~~and/or~~ and the duration of a light pulse event.

30. (currently amended) Apparatus according to ~~any of claims~~ claim 27 to 29, wherein the optical energy delivery system includes a hand-held light delivery unit arranged to be positioned relative to the target zone manually by user.

31. (currently amended) Apparatus according to ~~any of claims~~ claim 27 to 30, further including an exhaust arrangement facilitating removal of soot/pyrolysed material and the particulate material.

32. (currently amended) Apparatus according to ~~any of claims~~ claim 27 to 31, wherein the apparatus is controllable to deliver the light energy in the form of a pulse of light (~~pulse event~~).

33. (currently amended) Apparatus according to claim 32, wherein the apparatus includes means to adjust ~~and/or limit~~ at least one:

the pulse repetition rate of successive light pulses; ~~pulse event and/or~~
the duration of said pulse of light; ~~a light pulse event, and/or~~
the intensity of said pulse of light; ~~and the light delivered; and/or~~
the ~~spectrum or spectrum range of~~ said pulse of light ~~the radiant optical energy~~.

34. (currently amended) Apparatus according to ~~any of claims~~ claim 27 to 33, wherein the optical energy delivery system includes a manually actuatable trigger for initiating a light pulse when the delivery means is positioned to the users satisfaction.